

### Remarks

Reconsideration and allowance of the subject application are respectfully solicited.

Claims 1-5 and 7-11 remain pending in the application, with Claims 1 and 11 being independent. Claims 1, 2 and 11 have been amended herein.

Claim 11 was rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,956,055 (Gibson et al.). Claims 1, 2, 4, 5 and 8-10 were rejected under 35 U.S.C. § 103 as being unpatentable over Gibson et al. in view of U.S. Patent No. 6,227,644 (Perner). Claims 1-4 and 7-10 were rejected under § 103 as being unpatentable over Gibson et al. in view of U.S. Patent No. 5,448,269 (Beauchamp et al.). These rejections are respectfully traversed.

As is recited in independent Claim 1, the present invention relates to a printing apparatus for printing an image on a printing medium while relatively moving at least one of a printing head provided with an array of a plurality of printing elements and the printing medium. The apparatus includes a carriage, detection means and control means. The carriage mounts the printing head, and is movable relative to the printing medium in a scanning direction crossing the array of the plurality of printing elements. The detection means is mounted on the carriage for detecting printing positions of an array of printed pixels corresponding to the array of the plurality of printing elements. The detecting means detects printed pixels printed by any of the plurality of printing elements. The control means adjusts drive timing of any of the plurality of printing elements according to detection results of the detection means so as to make printing positions of

subsequently printed pixels close to a predetermined center position. The control means adjusts the drive timing of any of the printing elements that are determined from the plurality of printing elements to have displacement amounts of printing positions of corresponding printed pixels from a printing position of a printed pixel corresponding to one end side of the array of printing elements equal to or greater than a predetermined amount, so that a deviation amount between printing positions of printed pixels corresponding to the one end side and the other end side of the array of printing elements is equal to or smaller than a predetermined amount.

As is recited in independent Claim 11, the present invention relates to a printing method for printing an image on a printing medium while relatively moving at least one of a printing head provided with an array of a plurality of printing elements and the printing medium. The method includes the steps of relatively moving at least one of the printing head and the printing medium in a scanning direction crossing the array of the printing elements so that an array of printed pixels corresponding to the array of the printing elements is printed on the printing medium, detecting printing positions of the array of printed pixels by detecting printed pixels printed by any of the plurality of printing elements and adjusting drive timing of any of the plurality of printing elements according to detection results of the printing positions so as to make printing positions of subsequently printed pixels close to a predetermined center position. The controlling step adjusts drive timing of any of the printing elements that are determined from the plurality of printing elements to have displacement amounts of printing positions of corresponding printed pixels from a printing position of a printed pixel corresponding to one end side of

the array of printing elements equal to or greater than a predetermined amount, so that a deviation amount between printing positions of printed pixels corresponding to the one end side and the other end side of the array of printing elements is equal to or smaller than a predetermined amount.

Thus, the above arrangement and method includes at least two significant features. First, the apparatus and method can adjust the drive timing of any the printing elements so that a deviation amount between printing positions of printed pixels corresponding to one end side and another end side of an array of printing elements is equal to or smaller than a predetermined amount. Second, the printing elements whose drive timing is adjusted are the printing elements having displacement amounts of printing positions of corresponding printed pixels from a printing position of a printed pixel corresponding to one end side of the array of printing elements equal to or greater than a predetermined amount.

Gibson et al. can compensate for skewed printing in an ink jet printer so that the bottom-most ink dot placement location in a skewed column printed in a first scan is not offset in the scanning direction relative to the top-most ink dot placement location in a skewed column printed in a subsequent scan more than a predetermined amount. In order to minimize this offset, the array of ink emitting orifices in Gibson et al. is segmented into at least two vertically adjacent segments or orifices and ink dot placement locations for at least one of the segments is shifted in a transverse direction while the ink dot placement location associated with the other segment remains unchanged.

Because Gibson et al. merely compares the offset error E between the bottom-most pixel of column 38 of the first scan with the top-most pixel of column 40 of the second scan, Gibson et al. cannot be said to disclose or suggest adjusting drive timing of any of the printing elements that are determined from a plurality of printing elements to have displacement amounts of printing positions of corresponding printed pixels from a printing position of a printed pixel corresponding to one end side of an array of printing elements equal to or greater than a predetermined amount, as is recited in independent Claims 1 and 11. That is, the displacement amounts of the intermediate pixels in Gibson et al. are not considered, regardless of their offset. Moreover, because Gibson et al. is concerned with the offset between columns of two separate scans, Gibson et al. can also not be said to disclose or suggest adjusting drive timing of any of a plurality of printing elements so that a deviation amount between printing positions of printed pixels corresponding to the one end side and the other end side of the array of printing elements is equal to or smaller than a predetermined amount, as is also recited in independent Claims 1 and 11. That is, Gibson et al. does not compare end pixels of the same array.

Thus, Gibson et al. fails to disclose or suggest important features of the present invention recited in independent Claims 1 and 11.

As discussed previously, Perner describes a printer having an image array 15 with two imaging detectors 16 for each nozzle. Beauchamp et al. describes an ink jet printer having a printhead and an optical sensor for sensing a test pattern. The printer controls drive timings of the plurality of printing elements based on the scanning speed and

bending of a platen. However, neither Perner nor Beauchamp et al. are believed to remedy the deficiencies of Gibson et al. noted above with respect to independent Claims 1 and 11.

Thus, independent Claims 1 and 11 are patentable over the citations of record. Reconsideration and withdrawal of the §§ 102 and 103 rejections are respectfully requested.

For the foregoing reasons, Applicants respectfully submit that the present invention is patentably defined by independent Claims 1 and 11. Dependent Claims 2-5 and 7-10 are also allowable, in their own right, for defining features of the present invention in addition to those recited in their respective independent claims. Individual consideration of the dependent claims is requested.

This Amendment After Final Rejection is an earnest attempt to advance prosecution and reduce the number of issues, and is believed to clearly place this application in condition for allowance. This Amendment was not earlier presented because Applicants earnestly believed that the prior Amendment placed the subject application in condition for allowance. Accordingly, entry of this Amendment under 37 CFR 1.116 is respectfully requested.

Applicants submit that the present application is in condition for allowance. Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action, and an early Notice of Allowance are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

  
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